



**PSC-SERIES**

***BATTERY CHARGER***

***USER'S MANUAL***

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## Introduction

Thank you for having chosen Storage Battery Systems, Inc. The PSC-series battery charger is designed to provide quality DC power for many years.

**This user's manual contains important technical instructions to be followed by qualified personnel responsible for the installation, start-up and maintenance of this unit. We recommend that this manual be read attentively to insure safe and reliable operation of this equipment.**

Should you require any assistance, please call our service department at:

Storage Battery Systems, Inc.  
N56 W16665 Ridgewood Dr.  
Menomonee Falls, WI 53051  
Tel: (262) 703-5800  
Fax: (262) 703-3073  
  
E-mail: [sbs@sbsbattery.com](mailto:sbs@sbsbattery.com)  
Web site : [www.sbsbattery.com](http://www.sbsbattery.com)

## IMPORTANT SAFETY INSTRUCTIONS

**Keep these instructions in a safe place: this manual contains important safety and operating instructions**

- **AC** and **DC** currents are present in this system **even** with indicators and breakers are on **“OFF”** position.
- Before performing any maintenance on this system make sure that the **battery** and the **AC** power are disconnected.
- Experienced and qualified personnel only must perform maintenance.
- Electrostatic sensitive components are used in this equipment. Proper ESD (electrostatic discharge) procedures must be followed to prevent any severe damage to electronic components.
- Working in the vicinity of a lead acid battery is dangerous: **batteries generate explosive gases** during normal operation. Therefore **never smoke** or allow an **open spark** or **flame** in the vicinity of the battery or engine.
- To reduce risk of battery explosion, follow these instructions and those on the battery.
- Never charge a **frozen** battery.

## Installation

### **Placement:**

**FOR INSTALLATION, PLEASE REFER TO NATIONAL AND LOCAL ELECTRICAL CODES.**

**The system is a very heavy equipment. To prevent personal injury or equipment damage, use lifts and extreme care when handling.**

### **Ventilation and cooling:**

The rectifier/charger is rated to better perform within 18°F (–10°C) and 122°F (+50°C) temperature range.

To calculate the required air displacement (exchange) volume, please use the following equation:

$$V = \text{BTU} \times e^{(0.125 \times H \times T_k / T_o)} / (T_r - T_k)$$

V = air flow: [cubic meter/hour]

BTU: Total dissipated heat

T<sub>r</sub>: Maximum allowed room temperature [°K] {i.e. 50°C = 323°K}

T<sub>k</sub>= Temperature of input cooling air

T<sub>o</sub>= 273 °K

H = Altitude [km]

### **Avoid placing the system in direct sunlight**

N.B. to insure **adequate ventilation** and safe access make sure that the following clearances are respected:

- 3 in. (10 cm) on the sides and top
- 3 feet (1 meter) in front of the unit.

Should seismic conditions require a more secure installation the unit may be **bolted to the floor**. Four (4) holes are provided for this purpose.

## **Electrical Connection and wiring**

Before Connecting the PSC battery charger make sure that:

- The battery is disconnected (if applicable)
- The circuit breakers are OFF
- The relays, fuses and circuit boards are installed
- The unit is wired in accordance with the instructions (refer to the wiring connections and electrical diagram)

Wire size is very important, The **nameplate** provides the essential information regarding the input and output voltages and currents.

Refer to your Local or **National Electrical Code** for WIRE GAUGE and GROUNDING instructions.

Wire ampere capacity must be sized to the maximal correspondent current.

Correct voltage and polarity are of critical importance. Check all connections for tightness and polarity.

Connect battery (if applicable) to the output terminals observing its polarity.

## **Power up**

After all wires installation is completed and has been double checked, the unit may be powered up as follow:

- Before to connect the load to the charger, compare the critical characteristics of the load with the critical characteristics of the charger (i.e. **measure** ondulation, line-neutral tension, positive-neutral tension).
- Keep a log of manipulations (i.e.  $V_{\text{FLOAT}}$  and  $V_{\text{EQUALIZE}}$  values entered, alarm messages, alarm and SCR blinking leds).
- All input and output breakers must be on "**OFF**" position
- Apply power to the equipment from the source panel
- Turn on AC breaker ("**ON**" position)
- Turn on DC breaker (if supplied) ("**ON**" position)
- Green LED must turn **ON**
- Wait 5 seconds till the indication Screen (**LCD**) indicates the system output voltage and status
- The system soft starts by rising the output current and the voltage

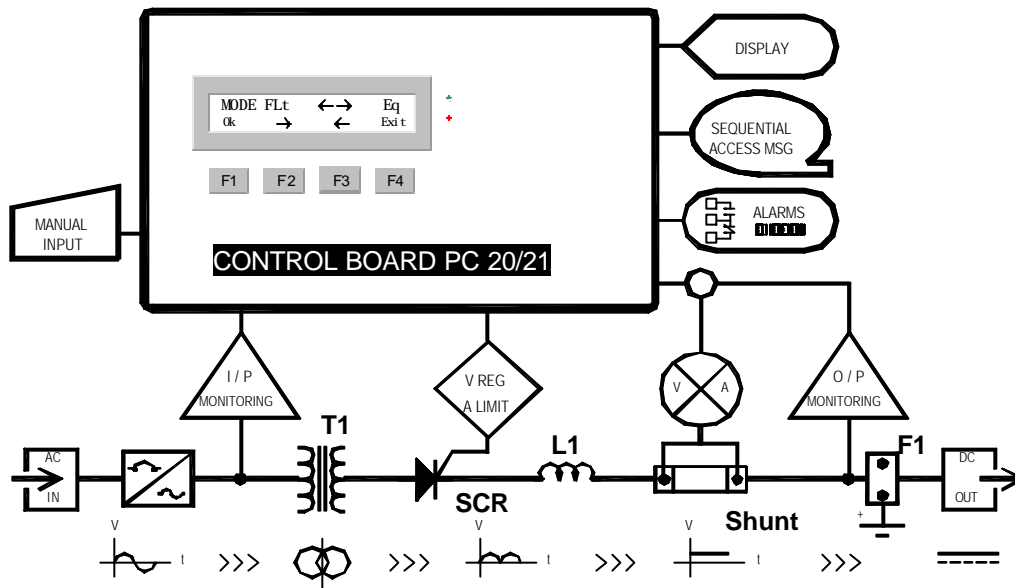
If readings or calibration of the unit is necessary, refer to the **field programming** section for more information.

## **System power Off procedure**

- Open the AC breaker (OFF position)
- Open the DC breaker (if supplied) (OFF position)
- Open the source panel's AC breaker (OFF position)
- If work inside the unit has to be performed, wait 5 minutes to discharge the filter capacitors or use bleeding resistors of the correct rating to discharge the capacitors.

Now the system can be considered de-energized.

## Theory of operation



**Control Board:** the **PC20/21** series control board provides automatic charge control, precise voltage regulation, alarm status annunciation and display.

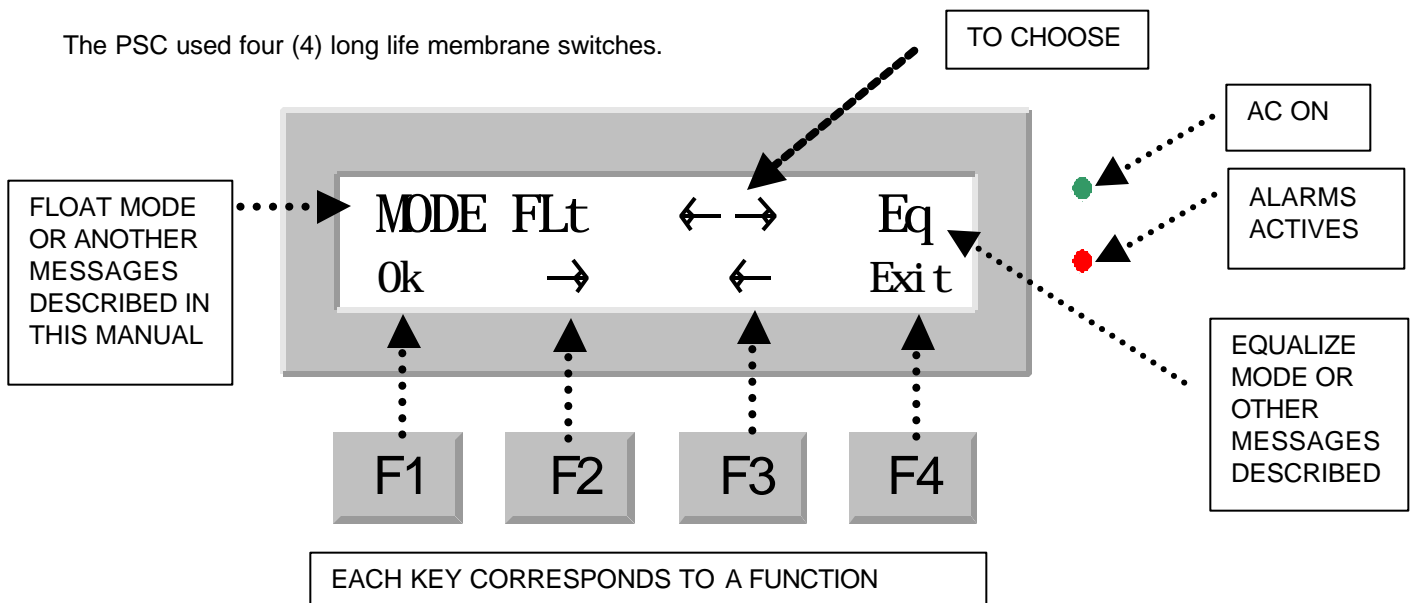
## Display Screen and Keypad

### Display Screen

The PSC-series provides a very flexible and user friendly interface. The display supplied with the standard unit's features a high visibility, back light LCD display.

### Keypad:

The PSC used four (4) long life membrane switches.



### Fixed charger mode:

#### Display unit

Adjustable values are displayed on the higher row of the LCD, i.e. number of relays, alarm On/Off, voltage level.

Keys function are displayed on the lower row, depending of the menu context.

When an alarm is active on the charger exact failure message appears and the red led blinks to warn the user.

In case of multiple alarms the PSC display unit shows sequentially all the warning messages.

There is also an AC sector detection led (green led).

The user is able to save his parameters individually.

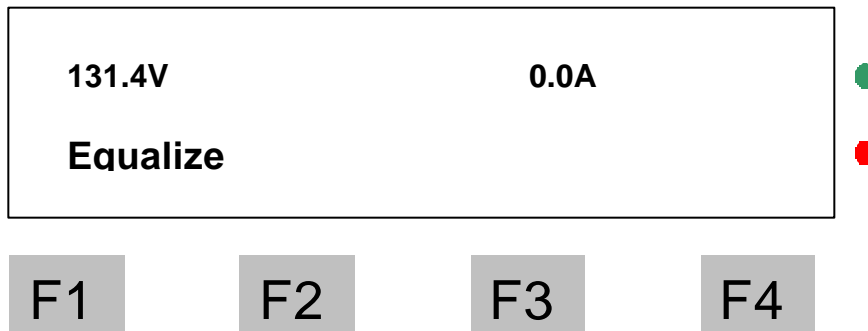
LCD power save feature shut down the display unit after 5 minutes of keyboard inactivity. When the PSC enter in power save mode it saves the latest values entered. Upon wake-up PSC return to main menu.

The display accuracy is  $\pm 2\%$ ,  $\pm 1$  digit

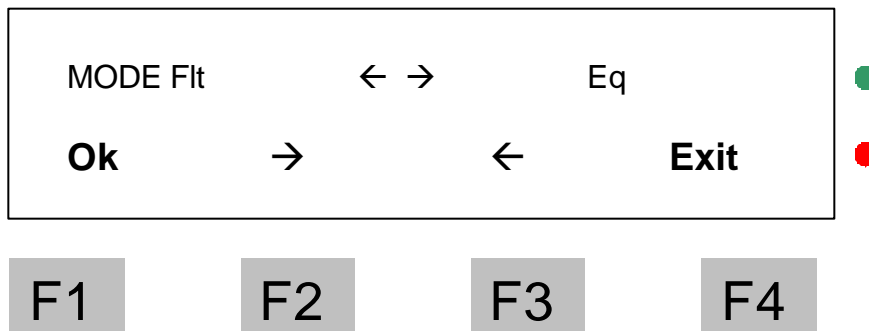


## Accessing menu via keypad; overview:

On power-up the following readings appears on the screen (*example*):

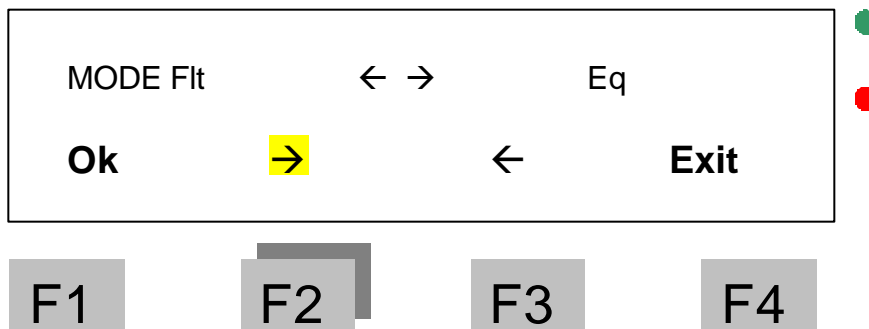


From that point, if you press any key of F1 to F4, only once, you reach the *menu* screen:

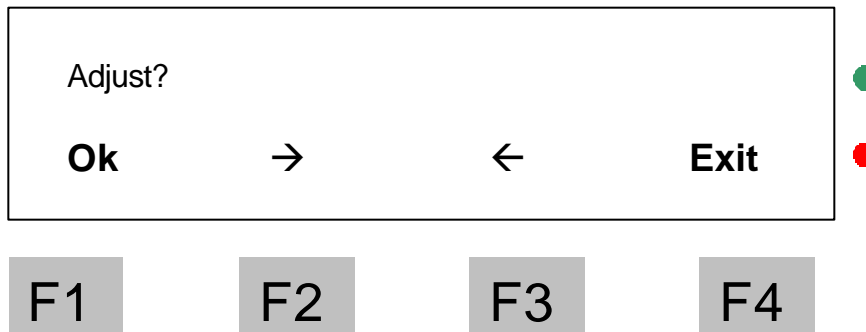


F1 (Ok), gives you access to Float / Equalize menu. Press F4(Exit) to step back to the menu.

From the *menu*, you may reach the different functions by pressing **F2(→)**:



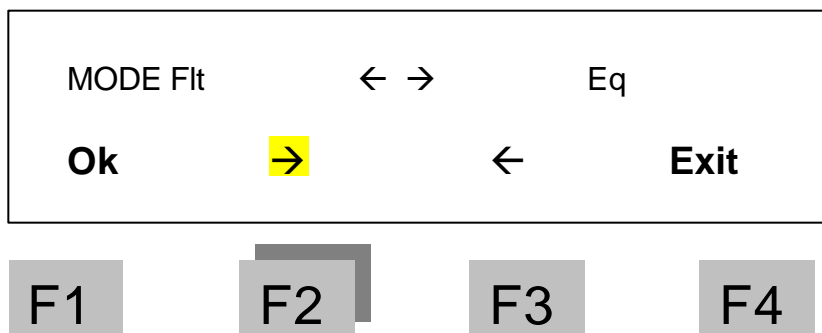
...after one touch of the **F2 (→)** key, you get the first function “**Adjust**”:



Continuing pressing **F2 (→)** will make the screen successively scroll through the following functions:

- **Reset Alarm ?** (present only in case of alarm)
- **Adjust?**
- **Reading?**
- **Relay test?**
- **Contrast LCD**

And pressing **F3 (←)**, 4 times, will make the screen scroll in the opposite direction, back to the following initial **menu** screen:



Each function has itself many sub-functions represented by the following tree structure.

## Menu structure quick overview:

*(some of the below menu items may be not applicable for your order)*

From the previous menu screen, press F2

F2 (→) **Reset Alarm?** (visible only in case of alarm)

F2 (→) **Adjust?**

F1 (Ok)

**Enter Password** F2 F1 F3 (...password for fixed charger only)

**(Warning:** Modifications to the following settings affect output voltage and output current of the charger and should be done only by qualified technician)

... **Control?**  
 F1 (Ok)  
 F2 (→) **Float** 124.9 (for example)  
**I Lim** 23.3A  
**Eq** 131.5 On  
**TEQ** 08 H \*  
**LVEQ** 106.1V On \*  
**TALimEq** 05mn On \*  
**AC Eq** On \*  
**T Float** 30 D \*

( \* ) : available only if Eq is "On"

F2(→) ..... **Alarm?**  
 F1 (Ok)  
 F2 (→) **Talarm** 10 S (for example)  
**HVAL** 138.1V On  
 ... **HVSH** 90.2V Off  
**L VAL** 100.0V On  
**L Vdis** 61.5V On  
**GNDF-** 5.0mA Off  
**GNDF+** 5.0mA Off  
**AC Fail** On  
**LCD latch** Off  
**Com AI latch** Off  
**Ind AI latch** Off  
**Audio Alarm** Off  
**Mesg latch** Off  
**Rct. fail** On  
**Htemp** Off  
**H Ext T** 100C Off  
**L Ext T** 00C Off  
**ACHV** 160.0V Off  
**ACLV** 0.0V Off  
**Fuse** Off  
**Hi ripple** Off  
**I lim Alarm** Off  
**Eq Alarm** Off

**Bat. disch**

**Off**

Pressing F3(←) repetitively will make you scroll back in the menu. Pressing F4(Exit) will make you step one level back in the hierarchy of the tree menu.

F2(→) .....

**Level2?**

F1 (Ok)

**Enter Password** F2 F1 F3 (...password for fixed charger only)

**(Warning:** Modifications to the following settings should be done by qualified technician)

	<b>Display Off</b>	<b>Off</b>	<b>(for example)</b>
F2(→)	<b>Default value</b>		
...	<b>Nom Volt</b>	<b>150V</b>	
	<b>Nom AMP</b>	<b>25 A</b>	
	<b>DCV cal</b>	<b>132.0V</b>	
	<b>DCA cal</b>	<b>0.0A</b>	
	<b>AC display</b>	<b>Off</b>	*
	<b>ACV cal</b>	<b>78.4V</b>	
	<b>ACA cal</b>	<b>539.5A</b>	
	<b>VMIN</b>	<b>0.0V</b>	
	<b>VMAX</b>	<b>160.0V</b>	
	<b>IMAX</b>	<b>*02.2A</b>	
	<b>Remote V sens</b>	<b>Off</b>	
	<b>Load sharing</b>	<b>Off</b>	
	<b>Tcomp</b>	<b>Off</b>	
	<b>LCD Pwr save</b>	<b>Off</b>	
	<b>Remote EQ</b>	<b>Off</b>	
	<b>AH display</b>	<b>Off</b>	*
	<b>Batt capa</b>	<b>100AH</b>	

( \* ) : affect menu option in **Reading** submenu if set to "ON"

Pressing F3(←) repetitively will make you scroll back in the menu. Pressing F4(Exit) will make you step one level back in the hierarchy of the tree menu.

F2(→) **Reading?**

F1 (Ok) : ..... **Frequence**

F2(→) **AC display** \*

... **AH meter** \* (not yet available)

( \* ) : must be set "ON" in **Level2** menu, to be visible here

F2(→) **Relay test?**

F1 (Ok) :

F1(Yes)

F4(No)

F2(→) **Contrast LCD**

Press F1 (Ok) :



F1(Set)

F4(No)

## **MENU DETAILED FUNCTIONS:**

*(some of the below menu items may be not applicable for your order)*

Definition of the 4 keys functions. **Display** field explains the key function shown on the LCD lower row depending on sub-menu context.

<b><u>Key</u></b>	<b><u>ACTION</u></b>	<b><u>Display</u></b>	<b><u>NOTE</u></b>
<b>F1</b>	"Ok" key	<b>OK</b>	Enter the displayed sub-menu (or Set key for sub-function)
<b>F2</b>	Scroll Down sub-menu		Go UP next selection
<b>F3</b>	Scroll Up sub-menu		Go DOWN last selection
<b>F4</b>	Return to previous menu	<b>Exit</b>	Return last selection

### **Main menu:**

Use → or ← keys to scroll the level 0 sub-menus. **SET** to enter menu.

### **Equalize:**

<b><u>DISPLAY</u></b>	<b><u>Press</u></b>	<b><u>ACTION</u></b>
<b>Float Equalize Exit</b>	<b>Float</b> <b>Equalize</b> <b>Exit</b>	Set float mode Set Equalize mode Return to main menu

<b><u>DISPLAY</u></b>	<b><u>Press</u></b>	<b><u>ACTION</u></b>
<b>Reading</b>	<b>SET</b>	Display frequency, AC display, AH meter

### **LCD Contrast:**

<b><u>DISPLAY</u></b>	<b><u>Press</u></b>	<b><u>ACTION</u></b>
<b>Contrast LCD</b>	<b>SET</b> <b>+</b> <b>-</b>	Access contrast control Contrast High Contrast Low

## Reset alarms and relays:

(available in case of alarm only)

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>
Reset relays	Yes No	Reset all the relays Go to Reset alarm
Reset Alarm msg (not displayed)	Yes No	Clear all alarms messages Go to Relay test
Relay Test (not displayed)	Yes No	Test all relays Go back one level

## Adjust:

Use → or ← keys to scroll the sub-menus. **SET** to enter menu. **EXIT** to return to previous menu.

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>
PASSWORD	F2-F1-F3 (Push in order) EXIT	Enter Level 1 Return to previous menu Password must be valid to access Control, Alarms and reading sub-menu
Control?	SET	Go to Control adjustments
Alarms?	SET	Go to alarm adjustments
Level 2?	SET	Go to level 2 sub-menu

## Control:

Use → or ← keys to scroll the Control sub-menus. **SET** to enter menu. **EXIT** to return to previous menu.

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Default Value</u>
Float	+ or -	Adjust Float Voltage (V)	Vnom X 1.09
I LIM	+ or -	Adjust Current Limit (A)	
Eq	SET + or -	Toggle On/Off Equalization Voltage Adjust Equalization Voltage (V)	On Vnom X 1.12
T eq	+ or -	Adjust Equalization Time (Hour)	
L VEQ	+ or -	Adjust Low Equalization Voltage (V)	Vfloat X 0.85
TA LIM E	+ or -	Adjust Time/Current limit Equalization (Minute)	5 min
ACEq	SET	Toggle On/Off AC Equalization	On
Tfloat	+ or -	Adjust Float Timing (Days)	28 Days

## Alarms:

Use → or ← keys to scroll the Alarm sub-menus. **SET** to enter menu. **EXIT** to return to previous menu.

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Default Value</u>
<b>Talarm</b>	<b>+ or –</b>	Adjust delay before alarm activates (sec)	10 sec
<b>HVAL</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust High Voltage alarm level (V) Go to Relays selection/toggle menu Toggle On/Off High Voltage alarm Select relays number (1 to 7)	Veq x 1.05  On No. 2
<b>HVSH</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust High Voltage Shutdown level (V) Go to Relays selection/toggle menu Toggle High voltage shutdown Select relays number (1 to 7)	Veq x 1.1  Off No. 8
<b>LVAL</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Low Voltage alarm level (V) Go to Relays selection/toggle menu Toggle On/Off Low Voltage alarm Select relays number (1 to 7)	0.8 x Vfloat  On No.3
<b>LVDis</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Low Voltage Disconnect level (V) Go to Relays selection/toggle menu Toggle Low voltage Disconnect Select relays number (1 to 7)	   No. 4
<b>GNDF–</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Negative Ground Fault level (mA) Go to Relays selection/toggle menu Toggle Negative Ground Fault Select relays number (1 to 7)	5 mA  On No. 4
<b>GNDF+</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Positive Ground Fault level (mA) Go to Relays selection/toggle menu Toggle Positive Ground Fault Select relays number (1 to 7)	5 mA  On No. 4
<b>AC Fail</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Select relays number (1 to 7) Go to Relays selection/toggle menu Toggle On/Off AC Failure Alarm Select relays number (1 to 7)	  On No.5
<b>LCD latch</b>	<b>Not available</b>		
<b>Com Al latch</b>	<b>SET</b>	Toggle On/Off Common Alarm Latch	Off
<b>Ind alm latch</b>	<b>SET</b>	Toggle On/Off Individual Alarm Latch	On
<b>Audio latch</b>	<b>SET</b>	Toggle On/Off Audio Alarm Latch	Off
<b>Mesg latch</b>	<b>SET</b>	Toggle On/Off Alarm Display Latch	On

<b><u>DISPLAY</u></b>	<b><u>Press</u></b>	<b><u>ACTION</u></b>	<b><u>Default Value</u></b>
<b>Rct fail</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Select relays number (1 to 7) Go to Relays selection/toggle menu Toggle On/Off Rectifier Failure alarm Select relays number (1 to 7)	On   No.1
<b>H temp</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off High Temperature alarm Select relays number (1 to 7)	On
<b>H ext T</b>  <b>relay   xxx</b>	<b>+ or –</b>  <b>NEXT</b> <b>NEXT, On/Off</b>  <b>NEXT, + or –</b>	Adjust High External temperature level Alarm Go to Relays selection/toggle menu Toggle High External temperature level Alarm Select relays number (1 to 7)	
<b>L ext T</b>  <b>relay   xxx</b>	<b>+ or –</b>  <b>NEXT</b> <b>NEXT, On/Off</b>  <b>NEXT, + or –</b>	Adjust Low External temperature level Alarm Go to Relays selection/toggle menu Toggle Low External temperature level Alarm Select relays number (1 to 7)	
<b>ACVH</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust High AC Voltage level alarm Go to Relays selection/toggle menu Toggle High AC Voltage Level Alarm Select relays number (1 to 7)	Off
<b>ACVL</b>  <b>relay   xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Low AC Voltage level alarm Go to Relays selection/toggle menu Toggle Low AC Voltage Level Alarm Select relays number (1 to 7)	Off
<b>DC Fuse</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off Fuse alarm Select relays number (1 to 7)	
<b>Hi ripple</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off High Ripple alarm Select relays number (1 to 7)	Off
<b>Ilim Alarm</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off Current Limit alarm Select relays number (1 to 7)	
<b>Eq Alarm</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off Equalize alarm Select relays number (1 to 7)	Off No. 4
<b>Bat, disch</b>	<b>SET</b> <b>+ or –</b>	Toggle On/Off Battery Discharge alarm Select relays number (1 to 7)	Off Batt. Current >



			O/P current
--	--	--	-------------

Level 2:

Use → or ← keys to scroll the level 2 sub-menus. **SET** to enter menu. **EXIT** to return to previous menu

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Default Value</u>
<b>PASSWORD</b>	<b>F2-F1-F3 (follow in order)</b> <b>EXIT</b>	Enters Level 2 Return to previous menu Password must be valid to access Control, Alarms and reading sub-menu	
<b>Default Value</b>	<b>SET</b>	Toggle On/Off Select factory value On/Off	
<b>Display Off</b>	<b>SET</b>	Toggle On/Off When Off, all values are displayed When On, only values that are set to "On" are displayed	
<b>NomVolt</b>	<b>+ or -</b>	Adjust the Nominal Voltage displayed Once values is set Nominal Voltage is not displayed	Factory preset
<b>NomAmp</b>	<b>+ or -</b>	Adjust the Nominal Ampere displayed Once values is set Nominal Ampere is not displayed	Factory preset
<b>DCV cal</b> <b>offset XXX</b>	<b>+ or -</b> <b>NEXT, + or -</b>	Adjust the DC Voltage calibration Adjust the DC Voltage offset	
<b>DCA cal</b> <b>offset XXX</b>	<b>+ or -</b> <b>NEXT, + or -</b>	Adjust the DC Current calibration Adjust the DC Current offset	
<b>AC display</b>	<b>SET</b>	Toggle On/Off AC display	Off
<b>ACV cal</b>	<b>+ or -</b>	Adjust the AC Voltage calibration	
<b>ACA cal</b>		Adjust the AC Current calibration	

<b>VMIN</b>	<b>+ or -</b>	Adjust the Minimum Output Voltage Default value is 0	
<b>VMAX</b>	<b>+ or -</b>	Adjust the Maximum Output Voltage	
<b>IMAX</b>	<b>+ or -</b>	Adjust the Maximum Output Current	
<b>Remote V sens</b>	<b>SET</b>	Toggle On/Off the Remote Voltage Sensing	Off
<b>Load sharing</b>	<b>SET</b>	Toggle On/Off the Load Sharing	Off Negative slope regulation
<b>Tcomp</b>	<b>SET</b>	Toggle On/Off Temperature Compensation	Off
<b>LCD pwr save</b>	<b>SET</b>	Toggle On/Off LCD power save After 5 min of inaction on LCD goes on power save	Off
<b>Remote Eq</b>	<b>SET</b>	Toggle On/Off Remote Equalization	Off
<b>AH display</b>	<b>SET</b>	Toggle On/Off Ampere/Hour display	Off
<b>Bat cap</b>	<b>+ or -</b>	Adjust the Ampere/Hour capacity of Battery	

### Readings:

Use → or ← keys to scroll the Reading sub-menus. **SET** to enter menu. **EXIT** to return to previous menu.

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Default Value</u>
<b>Frequency</b>		Actual frequency	Active
<b>AC display</b>	<b>L</b> <b>N</b>	Display AC voltage Display AC current	Off Off
<b>AH meter</b>		Display Ampere/ Hour in percent Display Ampere/ hour	Off Off

**\*\* : If FIXED CHARGER mode is on “OFF” position then no alarms, float, equalize modes are accessible.  
(i.e. software exits set up mode after having chosen variable current or/and voltage)**

## **Modbus: (optional)**

### **Material configuration :**

The RS-232 communication operate in slave modbus, with 8 bits, 1 start and 1 stop bit. The speed of the transmission is configured on the communication card (**PCOM**). The available speed are 300, 1200, 4800, 9600 (default) and 19200 bauds. The address of the **PCOM** card is on board configurable from address 1 to 255. The default address is "1".

### **RAM memory map:**

The following map show the structure RAM of the **PCOM** card. **(R)** mean « **readable** » and **(W)** mean « **writable** ».

Variable	Address (dec)	Bytes	Status
<b>Vout</b>	00	2	R
Vfloat / Vref (setting value)	01	2	W/R
Vequalize (setting value)	02	2	W/R
Volt low equalize (setting value)	03	2	R
Volt low alarm (setting value)	04	2	R
Volt low alarm disconnect (setting value)	05	2	R
Volt high alarm (setting value)	06	2	R
Volt high alarm shut down (setting value)	07	2	R
GNDF+ (setting value)	08	2	R
GNDF- (setting value)	09	2	R
I out (setting value)	10	2	R
I Lim (setting value)	11	2	W/R
V ph1 (setting value)	12	2	R
V ph2 (setting value)	13	2	R
V ph3 (setting value)	14	2	R
I ph1 (setting value)	15	2	R
I ph2 (setting value)	16	2	R

I ph3 (setting value)	17	2	R
Status Alarm Rectifier Fail	18H	1	R
Status Alarm High Volt	18L	1	R
Status Alarm low Volt	19H	1	R
Status Alarm neg ground	19L	1	R
Status Alarm pos ground	20H	1	R
Status Alarm AC Fail	20L	1	R
Status Alarm HV Shut Down	21H	1	R
Status Alarm Low Volt Disc	21L	1	R
Status Alarm AC high volt	22H	1	R
Status Alarm AC low volt	22L	1	R
Status Alarm High external temperature	23H	1	R
Status Alarm low external temperature	23L	1	R
Status Alarm High temperature of card	24H	1	R
Status Alarm Battery Discharging	24L	1	R
Status Alarm I Lim	25H	1	R
Status Alarm Equalize	25L	1	R
Status Alarm cut fuse	26H	1	R
Not Used	26L	X	X
Mode Equalize/Float	27	2	W/R
Reset Alarms	28	2	W
Password	29	2	W

Table 1

**Note:** Reading the value “FF<sub>(HEX)</sub>” at any “Status Alarm” (setting value or mode) address means that this alarm (setting value or mode) has not been ordered with your charger.

### 1.1 - Format for voltage and current values :

Voltage and current values are coded on 2 bytes :

Example:

$V_{out} = 651.3V$  (6513 decimal = 1971 hex),  
so the coded value will be :

19 hex / 71 hex; (19 MSB, 71 LSB) or 6513 in decimal (65 MSB, 13 LSB)

(*MSB : most significant byte, LSB : less significant byte*)

## 1.2- logic of alarms:

Address value	FF	0	1
alarm state	Not available	Not active	Active

Table 2

## 1.3- Float/Equalize :

The command “Equalize/Float” is coded on 2 bytes. (Reading mode) : « **0** » indicate that the charger is in **Float** mode, « **1** » indicate that the charger is in **Equalize** mode (see table 3).

To change operation mode (Float or Equalize), via RS-232, parameter “**Eq**” (*in “Adjust\Control” submenu*) must be “**ON**” and parameter “**Remote RS-232**” (*in “Adjust\Level2” submenu*) must be “**ON**” too. (See table 3)

If the value “**0**” is sent to **address 27**, the charger is forced to mode “**Float**”. On the contrary, if the value “**1**” is sent to **address 27**, the charger is forced to mode “**Equalize**”.

## Writing/Reading :

<b>address</b> <b>mode</b>	<b>27</b>
<b>float</b>	<b>0000</b>
<b>equalize</b>	<b>0001</b>

Table 3

## 1.4- Reset Alarm :

To deactivate an alarm, just send the value « **1** » at the address 28 (*in writing mode*).

<b>address</b> <b>mode</b>	<b>28</b>
-------------------------------	-----------

<b>alarm reset</b>	<b>0001</b>
------------------------	-------------

Table 4

## RS-232 Connections:

The RS-232 standard allows only a single point-to-point connection. This means only one device may be connected to the serial port of a modem, computer or in this case the SBS **PCOM** card.

The cable needed for the RS-232 communication must have a maximum length of 15.2m (50 ft.), with DB9 male connector at the **PCOM** card end and to other end on the mating device port connector.

SBS **PCOM** card comes configured as RS-232 null modem so no other device will be needed for connection with a DTE (*data terminal equipment*). See figure 1 cable connection.

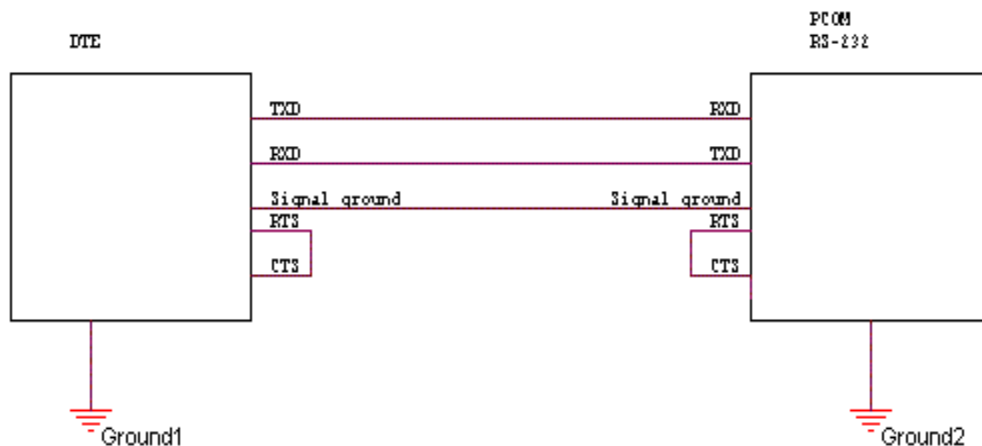


Figure 1: cable connections

## **Trouble shooting**

Field programming

Should trouble occur with your PSC rectifier please read the following:

**Warning:** qualified personnel should service this unit only. The battery and AC supply should be disconnected before replacing any component.

<b>Fault</b>	<b>Recommendation</b>
No output	<ul style="list-style-type: none"><li>- verify that the AC breaker is closed ("ON")</li><li>- verify that the AC supply is of correct voltage and frequency</li><li>- verify the DC output fuse</li><li>- verify the output and input connections</li><li>- replace control board PC20/21</li><li>- replace thyristor modules</li></ul>
abnormal noise	<ul style="list-style-type: none"><li>- verify thyristors</li><li>- replace control board PC20/21</li></ul>

If trouble persists please contact our service department at:

**Storage Battery Systems, Inc.**  
**N56 W16665 Ridgewood Dr.**  
**Menomonee Falls, WI 53051**  
**Tel: (262) 703-5800**  
**Fax: (262) 703-3073**

**E-mail: [sbs@sbsbattery.com](mailto:sbs@sbsbattery.com)**

**Web site: [www.sbsbattery.com](http://www.sbsbattery.com)**

## **Regular preventive maintenance**

Regular maintenance is required to insure reliable operation of your system.

	<b>Action</b>	<b>frequency</b>
B	measure and record the voltage across each battery cell and across the entire battery.	monthly
B	verify and record the electrolyte level vented battery in each battery cell. If necessary top off with distilled water	monthly
B	verify and record the specific gravity of each battery cell	monthly
C	verify the operation of all indicators	monthly
B, C	using vacuum cleaner equipped with a small brush removes accumulated dust especially around ventilation openings	yearly
B, C	visually verify the condition of all components	yearly
B, C	verify all connections. If necessary recommended uses of torque re-torque to manufacturers specifications wrench	yearly
B	clean and re-grease all battery connections	yearly
B	wash battery using distilled water only	yearly

**B = battery      C = charger**

For systems supplied with lead acid batteries, a partial discharge of the battery is recommended on an annual basis, to verify battery and charger performance.

For systems supplied with nickel-cadmium batteries we recommend a complete discharge and decommissioning charge on a bi-annual basis. SBS provides both these services.



## Control board (PC) - adjustment procedure

### Required tools:

DC voltmeter, DC ammeter or clamp-meter, DC load bank or dummy load (to simulate a load).

**Use the test report of the unit ( included in the user's manual) to have the following data handy:**

DC output float voltage  $V_f$

DC output equalize voltage (if required)  $V_e$

DC output maximum current  $i_m$

### Example:

Suppose that you have 18 Ni-Cad cells:

(for your specific Ni-Cad or lead acid please use the information provided by the battery supplier)

### Constant voltage:

- Float voltage =1.42 volt/cell
- Equalize voltage =1.55 volt/cell
- Number of cells = 18

**Current limit:** adjust the current limit to the **test report value**

### Nickel cadmium battery

A	B	C
Float voltage $V_f$	Number of cells x 1,42*v/cell	<b>25,6 v</b>
Equalize voltage $V_e$	Number of cells x 1,55**v/cell	<b>27.9v</b>
Auto equalize level $V_{ae}$	$V_f \times 0,85$	<b>21.76 v</b>
Maximum charging current $I_{max}$	$I_{max}$	<b>5 Amp.</b>

## Procedure

**switch** the AC breaker off.

**Switch** the DC breaker off (if provided).

**Disconnect** batteries from charger.

**Connect** resistive load

**Connect** DC voltmeter across DC output terminal (see wiring diagram)

**Switch** the AC breaker on.

Use → or ← keys to scroll the Control sub-menus. **SET** to enter menu. **EXIT** to return to previous menu

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Value</u>
<b>Float</b>	<b>+ or -</b>	Adjust Float Voltage (V)	<b>25,6 V</b>
<b>I LIM</b>	<b>+ or -</b>	Adjust Current Limit (A)	<b>5,0 A</b>
<b>Eq</b>	<b>SET</b>	Toggle On/Off Equalization Voltage	<b>On</b>
	<b>+ or -</b>	Adjust Equalization Voltage (V)	<b>27,9 V</b>

<b>T eq</b>	<b>+ or -</b>	Adjust Equalization Time (Hour)	
<b>L VEQ</b>	<b>+ or -</b>	Adjust Low Equalization Voltage (V)	<b>21,76 V</b>
<b>TI LIM E</b>	<b>+ or -</b>	Adjust Time/Current limit Equalization (Minute)	<b>5 min</b>
<b>AC Eq</b>	<b>SET</b>	Toggle On/Off AC Equalization	<b>On</b>
<b>Tfloat</b>	<b>+ or -</b>	Adjust Float Timing (Days)	<b>28 Days</b>

## **Alarms adjustment procedure**

### **Required tools:**

DC voltmeter, DC ammeter or clamp-meter, DC load bank or dummy load (to simulate a load).

**Use the test report of the unit ( included in the user's manual) to have the following data handy :**

DC output float voltage  $V_f$

DC output equalize voltage (if required)  $V_e$

DC output maximum current  $I_m$

### **Example:**

Suppose that you have 18 **Ni-Cad** cells:

(for your specific **Ni-Cad** or lead acid please use the information provided by the battery supplier)

### **Constant voltage:**

- Float voltage =1.42 Volt/cell
- Equalize voltage =1.55 volt/cell
- Number of cells = 18

### **Nickel cadmium battery**

<b>A</b>	<b>B</b>	<b>C</b>
Float voltage $V_f$	Number of cells x 1,42* v/cell	<b>25.6 v</b>
Equalize voltage $V_e$	Number of cells x 1,55** v/cell	<b>27.9v</b>
High volts alarm $V_h$	$V_e \times 1,03$	<b>28.7 v</b>
Low volts alarm $V_L$	$V_f \times 0,8$	<b>20.4 v</b>

**Notes:** \*, \*\* float and equalize voltage provided by the battery manufacturer

## **Procedure**

**switch** the AC breaker off.

**Switch** the DC breaker off (if provided).

**Disconnect** batteries from charger.

**Connect** resistive load

**Connect** DC voltmeter across DC output terminal (see wiring diagram)

**Switch** the AC breaker on.

Use → or ← keys to scroll the level 2 sub-menus. **SET** to enter menu. **EXIT** to return to previous menu

<u>DISPLAY</u>	<u>Press</u>	<u>ACTION</u>	<u>Default Value</u>
<b>Talarm</b>	<b>+ or –</b>	Adjust alarm Timing (sec)	<b>10 sec</b>
<b>HVAL</b>  <b>relay xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust High Voltage alarm level (V) Go to Relays selection/toggle menu Toggle On/Off High Voltage alarm Select relays number (1 to 7)	<b>28,7 V</b>  <b>On</b> <b>No. 2</b>
<b>LVAL</b>  <b>relay xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Low Voltage alarm level (V) Go to Relays selection/toggle menu Toggle On/Off Low Voltage alarm Select relays number (1 to 7)	<b>20,4 V</b>  <b>On</b> <b>No.3</b>
<b>GNDF–</b>  <b>relay xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Negative Ground Fault level (mA) Go to Relays selection/toggle menu Toggle Negative Ground Fault Select relays number (1 to 7)	<b>5 mA</b>  <b>On</b> <b>No. 4</b>
<b>GNDF+</b>  <b>relay xxx</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Adjust Positive Ground Fault level (mA) Go to Relays selection/toggle menu Toggle Positive Ground Fault Select relays number (1 to 7)	<b>5 mA</b>  <b>On</b> <b>No. 4</b>
<b>AC Fail</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Select relays number (1 to 7) Go to Relays selection/toggle menu Toggle On/Off AC Failure Alarm Select relays number (1 to 7)	  <b>On</b> <b>No.5</b>
<b>Rectifier Fail</b>	<b>+ or –</b> <b>NEXT</b> <b>NEXT, On/Off</b> <b>NEXT, + or –</b>	Select relays number (1 to 7) Go to Relays selection/toggle menu Toggle On/Off AC Failure Alarm Select relays number (1 to 7)	  <b>On</b> <b>No.1</b>

## Warranty

### Electrical / Electronic Products Warranty

SBS/Primax warrants to the original user that its rectifying equipment, load banks, DC-DC converters, batteries, chargers and UPS systems are free from defects in factory workmanship and materials, such warranty being conditional upon the product having been installed, commissioned, operated and maintained by qualified personnel and according to manufacturer instructions.

SBS's liability is limited to repairing or replacing without charge at its factory any product or component which at user's expense has been returned to SBS or authorized service center within 1 year from date of commissioning whichever occurs first. SBS's repair or replacement of any defective product shall constitute fulfillment of his obligations.

This warranty applies to manufacturer products which are shown by the purchaser to have been originally defective and shall not apply to products which must be repaired or replaced due to normal wear, misuse, negligence, wreckage, accident, any act of god or to products which have been repaired or altered outside of seller's factory or one of its authorized service centers unless authorized solely by SBS.

SBS shall not be liable for loss, damage, or expense, consequential or otherwise from the use of its products or from any other cause.

This warranty supersedes and is given in place of all other warranties expressed or implied or conditions whether statutory or otherwise as to quality and fitness for any purpose for which the products are supplied. No person, agent or dealer is authorized to give any warranty on behalf of manufacturer or to assume for seller any other liability in connection with any of its products unless made in writing and signed by an officer of SBS.

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## **ANNEXES:**

**Electric diagram**

**Part list**

**Mechanical Drawings**

**Test report**